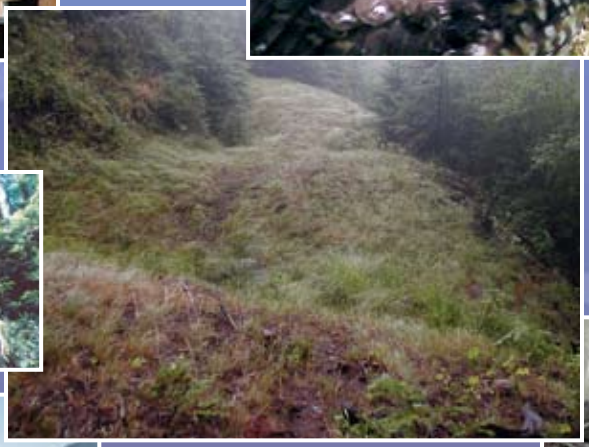
Annual Progress Report 2004

Interagency Regional Monitoring



Northwest Forest Plan - 2005

Summary

Eight federal agencies have developed an implementation and effectiveness monitoring program encompassing over 24 million acres of federal land managed by the Forest Service, Bureau of Land Management, and National Park Service in western Washington, Oregon, and northwest California.

This monitoring is focused on important regional-scale questions about older forests, listed species (northern spotted owls, marbled murrelets), watershed condition, relations between federal agencies and Tribes, changing socioeconomic conditions in communities closely tied to federal lands, and compliance with meeting Northwest Forest Plan (the Plan) standards and guidelines.

The purpose of monitoring is to evaluate the success of the Plan in achieving the objectives of:

- Protecting and enhancing habitat for late-successional and old-growth forests (older forests) and related species;
- Restoring and maintaining the ecological integrity of watersheds and aquatic ecosystems; and,
- Maintaining sustainable amounts of renewable resources and the stability of rural economies and communities.

Highlights from this report include the following monitoring efforts:

- 10-year report - In 2004, we finished compiling and analyzing the monitoring data and completed the first 10-year comprehensive report. A two-day science conference in April, 2005 provided a venue for the discussion of these results. See reports at http://www.reo.gov/monitoring/10yr-report/.
- Implementation Monitoring - Overall compliance in meeting Northwest Forest Plan and Record of Decision standards and guidelines was 97% for the 21 projects monitored.
- Late-successional and old-growth - In 1994, there were 7.9 million acres of forest defined by average tree size >20 inches in diameter. Between 1994 and 2003, 0.2 percent of older forest was clearcut, and another 1.3 percent was lost to stand-replacing wildfire. However, there was an overall net gain of over 1 million acres of older forest in the first decade after the Plan.
- Northern spotted owls - Population changes in 10 studied areas declined at an average annual rate of 3.4 percent. The Plan has been successful in maintaining habitat and initiating habitat restoration. Other factors, besides habitat, may also be contributing to observed declines in the population.
- Marbled murrelets - The population of marbled murrelets residing in the coastal waters adjacent to the Plan area was estimated at about 22,000 birds. The population has not changed significantly during the monitoring period of 2000-2003. The 2004 estimate was about 20,600 birds. Over 88 percent of nesting habitat on federally-administered lands occurred in reserved lands.
- Watersheds - For 250 watersheds studied, fifty-seven percent had higher condition scores in 2003 than in 1994 as a result of road decommissioning and other management activities. In 2004, 20 watersheds were sampled. Other accomplishments included the refinement of decision support models and an agreement between regional programs on common monitoring protocols.
- Social and economic - Forest communities in the Pacific Northwest are undergoing social and economic changes that are partly attributable to federal forest management policy. Communities are adapting, but economic ties between rural communities and nearby federal forests have changed. Monitoring shows that progress in meeting the Northwest Forest Plan social and economic goals was mixed during the first decade.
- Tribal - Two additional tribes provided responses regarding the effectiveness of federal agency consultation in addressing treaty and other rights, access to and use of resources, and other interests. This brought the total to 15 tribes interviewed (out of 76 total). A tribal monitoring advisory group assisted with monitoring efforts.

Highlight - 10 Year Report

A primary focus of effort for the regional monitoring team in 2004 was the preparation of the 10-year reports for the Northwest Forest Plan. This collection of reports is the first comprehensive analysis and interpretation of monitoring data since the 1994 Record of Decision.

These reports attempt to answer questions about the effectiveness of the Plan from new monitoring and research results. The set includes a series of status and trend reports, a synthesis of all regional monitoring and research results, and a report on interagency information management.

Status and trend reports

The status and trend reports focus on establishing new baselines of information from 1994, when the Plan was approved, and reporting change over the 10-year period. The status and trend series includes reports on monitoring of project implementation under Plan standards and guidelines, late-successional and old-growth forests, northern

Panel discussion at Conference on Science and the Northwest Forest Plan, April 19-20, 2005.

spotted owl population and habitat, marbled murrelet population and habitat, watershed condition, socioeconomic conditions, and government-to-government tribal relationships. Key findings from these reports are summarized in each of the module sections that follow (see pages 4-16).

Synthesis report

The synthesis report addresses questions about the effectiveness of the Plan by using the status and trend results and new research. It focuses on the validity of the Plan assumptions, differences between expectations and what actually happened, the certainty of the findings, and, finally, considerations for the future.

The synthesis report is organized in two parts: Part I – introduction, context, synthesis and summary and Part II - socioeconomic implications, older forests, species conservation, the aquatic conservation strategy, and adaptive management and monitoring. An overview of the findings of the synthesis report is available (see page 2).

Draft versions of these reports are available online at:
http://www.reo.gov/monitoring/10yr-report/.

When completed in the fall of 2005, the final published versions of these reports will also be made available through the Forest Service Pacific Northwest Station at:
http://www.fs.fed.us/pnw/publications/index.shtml.

Conference on Science and the Northwest Forest Plan

A 2-day conference was convened April 19-20, 2005 in Portland, Oregon to (1) develop awareness and understanding of science information from the Northwest Forest Plan monitoring programs, (2) describe advances in the state of knowledge over the last decade, and (3) explore policy and management implications of these findings. The conference's audience of over 500 participants included policymakers, land managers, and resource specialists from federal agencies; and people from universities, state agencies, nongovernmental organizations and interested publics.

The conference began with a plenary session including an overview of findings from each of the monitoring modules. Concurrent technical sessions were then held for watershed condition, spotted owls, late-successional and old-growth forest, marbled murrelets, and socioeconomic monitoring.

A panel discussion was then held to provide an overview of the findings of the synthesis team. The first day concluded with a poster session and mixer.

A focus on the synthesis report continued on the second day. The meeting concluded with a panel discussion of management implications including the perspective of federal agency executives.

Copies of the presentations at the conference are available online at:
http://outreach.cof.orst.edu/nwforestplan/agenda.htm

News reports of the conference are available at:
http://www.reo.gov/monitoring/10yr-report/documents/news-releases/index.html.

Synthesis

An important effort during 2004 was the synthesis of monitoring and research information by a select team of scientists (see box on page 3 for list of team members). The synthesis report focuses on four interconnected questions:

- Has the Plan resulted in changes that are consistent with objectives identified by President Clinton?
- Are major assumptions behind the Plan still valid?
- Have we advanced learning through monitoring and adaptive management?
- Does the Plan provide robust direction for the future?

This article provides a very short summary of their results. For additional information, the reader is referred to the first draft of the synthesis report available at: http://www.reo.gov/monitoring/10yr-report/documents/synthesis-reports/index.html

When completed, a final published version of the report will be available through the Forest Service Pacific Northwest Station at: http://www.fs.fed.us/pnw/publications/index.shtml.

Measurable Progress

Ten years is too soon to judge whether the Plan has been fully successful, but some trends are clear. A notable accomplishment is the protection of old-growth and riparian forests and associated species. Harvest of trees in old-growth and riparian areas has dwindled to insignificant amounts compared to historical harvest rates. The Plan protects

> A notable accomplishment is the protection of old-growth and riparian forests and associated species.

most existing old-growth stands from future harvest.

Other mid-seral stands are slowly developing old-growth characteristics, such as large trees and multistoried canopies. Other successes include active watershed restoration and decommissioning of roads, site-specific protection of sensitive species, improved watershed assessment processes, increased understanding of the distribution and habitat needs of species of concern, and advancing silvicultural practices to accelerate old-growth development.

> The Plan also fell short in some arenas. Specifically, timber harvest rates were lower than expected.

The Plan also fell short in some arenas. Specifically, timber harvest rates were lower than expected. Timber shortfalls resulted in economic hardship for some communities, but others were able to compensate by increases in other economic sectors or through active civic leadership.

Active fuels management in the drier forests of the eastern Cascades and Klamath-Siskiyou regions lagged behind expectations, perhaps increasing the risk of uncharacteristic large or severe fire in these regions.

The Plan failed to fully end "the gridlock within the federal government," although increases in cooperation among federal agencies and between research and management were noticeable.

Validity of Assumptions

> Many of the Plan's central assumptions have proven valid . . . Most of the best remaining habitat for northern spotted owls, marbled murrelets and other old-growth dependent species is found in reserves identified in the Plan.

Many of the Plan's central assumptions have proven valid. Old-growth forests are limited in distribution, but the network of reserves identified in the Plan encompasses most of the remaining old growth. Most of the best remaining habitat for northern spotted owls, marbled murrelets and other old-growth dependent species is found in these reserves.

The aquatic monitoring effort has demonstrated that key watersheds identified by the Plan generally have fewer roads and higher rates of road decommissioning and therefore higher condition scores.

Monitoring data abundantly demonstrate that trees can grow quickly in the productive forests of the Pacific Northwest. Increases in mean tree diameter in undisturbed stands suggest that new old-growth forests are being naturally recruited, with positive implications for both terrestrial and aquatic species. The Plan assumed that reserve networks would be large enough to withstand large disturbances without loss of function. Thus far, that assumption seems to hold true.

Several assumptions incorporated into the Plan have since shown to be unsupported, or only weakly supported. From a socio-economic perspective, it was assumed that timber flows from federal lands was a key determinant of community well-being. This is true in some communities, but not in most.

The dominant social values expressed in forest management have changed since Plan inception. For example, harvest of old-growth forests in matrix areas or thinning older forests in reserves is unacceptable to many people.

> The identification of barred owls and West Nile virus as potential threats to northern spotted owls demonstrates that providing habitat is a necessary but not sufficient condition for conserving species.

It was assumed that conserving the habitat of spotted owls would provide for the needs of many other old-growth dependent species. Because of the survey and manage program, we now recognize that a single-species focus is effective for only a limited number of other species, and that more holistic strategies are required. The identification of barred owls and West Nile virus as potential threats to northern spotted owls demonstrates that providing habitat is a necessary but not sufficient condition for conserving species.

Advances in Learning

The answer to the question "have monitoring and adaptive management advanced learning?" is a qualified yes. Without question, the monitoring program produced a wealth of data and information.

Major improvements in remote sensing and forest inventories provide a detailed picture of current forest conditions throughout the Plan area and allow tracking of changes in these forests.

Species surveys and population monitoring aid understanding of the distribution and habitat needs of many species and provide indicators of change for select species. Because of the survey and manage program, for example, more than 67,000 species locations

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were mapped - an unparalleled achievement for a monitoring program over a similar-sized area. The northern spotted owl monitoring program is one of the most intensive avian population monitoring efforts in North America.

The aquatic and riparian monitoring effort is systematically building a database on riparian and instream conditions that is amenable to both monitoring and exploring linkages among ecological drivers and responses at multiple spatial scales. Despite its late start, the socioeconomic program has produced findings that aid understanding of the large-scale context of the Plan, as well as its regional and local impacts.

However, room for improvement can be found. Rigorous broad-scale experiments were lacking. Experience with adaptive management areas is generally disappointing, because they have not facilitated the degree of innovation and experimentation expected. Too often, precaution seems to have trumped learning.

Looking to the Future

Whether the Plan is working or not is ultimately a question of values. Based on the criteria selected by the synthesis team, the Plan is generally succesful. Various issues remain including questions of spatial scale, temporal tradeoffs, interactions between pattern and process, and management flexibility.

Room for improvement includes opportunities for active management in dry forests, more efficient monitoring, and a commitment and follow-through on adaptive management.

> Based on the criteria selected by the synthesis team, the Plan is generally successful.

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Implementation Monitoring . . . . . .

Implementation monitoring is used to determine if planned activities and their associated standards and guides are being followed.

10-Year Report Highlights

Several activities were anticipated during the Plan's first 10 years (1994-2003) related to aquatic, terrestrial, social, and process strategies. For this report, data were assembled from agency databases or existing reports and checked by agency experts.

Terrestrial Strategy

- *Timber harvest* - In contrast to initial Plan expectations, 84.5 percent of the 340,300 acres harvested were by techniques characterized as partial removal, and only 15.5 percent were by regeneration harvest.
- *Other silvicultural activities* - Other activities such as mechanical treatment and prescribed fire were carried out, primarily in the wildland-urban interface.

Economic Well-Being

- *Timber offered* - The Plan used probable sale quantity (PSQ) for estimating the likely sustainable average, annual, timber-sale volume. About 421 million board feet of timber was attributable to the PSQ on an average annual basis since 1995. This can be loosely compared to the expected average annual amount of 776 million board feet anticipated for this reporting period. About 105 million board feet offered annually resulted from management on reserve lands.
- *Range use* - Both the number of animal unit months and allotments decreased by 30 percent, and the number of permittees decreased by 37 percent.

Aquatic Conservation Strategy

- *Watershed analysis* - Eighty-nine percent of watershed analyses, covering an average of more than 85 percent of the federal land area for all units, were completed.
- *Key watersheds* - The agencies identified 164 key watersheds for conserving at-risk fish species and high-quality water.
- *Watershed restoration* - Important activities included controlling road-related runoff and sediment production, restoring riparian vegetation, and adding complexity to the stream at a reported cost of nearly $91 million for 1998 to 2003.
- *Riparian reserves* - Improvements in riparian reserves included 927 miles of instream structures, 661 miles of instream fish passage, 68,800 acres treated, 660 miles treated, and 1,500 wetland acres treated.

Process Activities

- *Adaptive management areas* - Ten AMAs were established across the region. Efforts to test standards and guides or alternative management approaches had only limited success.
- *Interagency collaboration* - An interagency decision group called the Regional Interagency Executive Committee (REIC) established many interagency collaborative teams including a regional monitoring team.
- *Public participation* - Provincial advisory committees were established for each of the 12 planning provinces and include members of local communities.

Compliance with Standards and Guides

The approach to implementation monitoring has been to identify a random stratified sample of Plan projects or activities each year for evaluation.

- *Projects* - The monitoring of 240 projects from 1996-2003 showed that compliance with the standards and guides was very high (greater than 95 percent each year).
- *Patterns of noncompliance* - Of the total of 90 instances of noncompliance for projects, 53 percent were due to improper planning; 20 percent, to improper implementing of projects designed to follow the standards and guides; and 27 percent, for other qualified reasons.
- *Watersheds* - From 1999 to 2003, 89 watersheds were monitored resulting in much variability in compliance with the standards and guidelines. The major instances of noncompliance for watershed scale standards and guidelines centered mostly on the lack of completed or adequate planning documents, such as road-management plans.
- *Compliance Monitoring Database* - A database designed for implementation monitoring greatly assisted in the multiple year analysis for determining compliance results, trends, and applicability of the standards and guidelines from 1996 to 2003.

Program Enhancements

We recommended five areas for improving implementation monitoring for both activities and compliance monitoring: developing an activities database, improving the follow-up and distribution of compliance monitoring results, improving participation in monitoring, establishing a mandate and support for implementation monitoring for field units, and improving the general program design.

2004 Field Monitoring Season

Field monitoring in the summer of 2004 was the ninth year of project scale and fifth year of watershed scale monitoring. Standardized questionnaires are used to determine compliance with applicable standards and guidelines.

The 2004 program was designed to sample 2 projects for each of the 12 planning provinces. Sixteen prescribed fire, 4 mining, 2 recreation and 2 grazing projects were selected for monitoring. Projects actually monitored and included in annual results were 14 prescribed fire, 3 mining, 2 recreation, and 2 grazing projects. Twenty-one watersheds were also monitored.

Highlights

- Compliance for projects remains high with the average for the year at 97 percent.
- Thirteen of the twenty-one projects were 100% compliant.
- Noncompliance was associated with late-successional reserves, watershed analysis, riparian reserve widths, road management, coarse woody debris, and the lack of a monitoring plan for a mining project.
- Watershed analyses were completed for 17 of the 21 watersheds reviewed and two of the analyses had been updated.
- Road mileages in the reviewed watersheds were reduced since 1994. In 9 key watersheds reviewed, 123.2 miles of roads were decommissioned and .5 miles of road were constructed. At the 5th field watershed level, 193.3 miles of roads were decommissioned and 26.1 miles of roads were constructed. Road density information was reported for 19 of the 21 monitored watersheds.

Deschutes Provincial Advisory Committee monitoring the impacts of the Davis wildfire on the watershed.

- Assessments were completed for all the large late-successional reserves in the reviewed watersheds. Assessments for small late-successional reserves or groups of reserves were completed for 70% of the applicable watersheds.

Compliance by individual categories identified in the project review questionnaire for 2004.

Questionnaire Categories	Number of Responses			Percent Compliance**
	Met	Not Met	Not Capable*	
All land-use allocations	67			100
Late-successional reserves and managed late-successional areas	21	3		88
Watershed analysis, aquatic conservation strategy objectives, and riparian reserves	170	5		97
Matrix	28	1	3	97
Adaptive management areas	4			100
Research	4			100
Species	30			100
Other project questions	44	3	1	93
Biological Opinion question	4			100
Total of the 21 projects reviewed	**372**	**12**	**4**	**97**

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* Not Capable – physical site limitations prohibit true compliance or meeting the standard and guideline (for example, no existing snags or lack of sufficient material for coarse woody debris).

** Percent compliance = [(number of met + number of not capable) / (number of met + number of not capable + number of not met)] x 100. Responses of met and not capable were considered to have met the compliance criteria (from a biological perspective) associated with record of decision standards and guidelines.

Late-Successional & Old-Growth . . . .

The goal of the module is to provide information for evaluating the likelihood that the Plan will achieve the stated objectives for maintaining and restoring older forest. The monitoring is designed to address questions such as, "How much older forest is there? Where is it? How much has changed and from what causes?"

During 2004, the first comprehensive status and trend report was completed (Moeur and others, in press). It focuses on establishing baselines of information from 1994, when the Plan was approved, and reporting change over the period between 1994 and 2003.

10-Year Report Highlights

- We developed a map depicting the amount and extent of older forest at the start of the Plan, using remote sensing data, ground observations, and modeling techniques.
- We estimated the amount of change in older forest during the first decade after the Plan, using remotely sensed disturbance maps and from remeasured plot data.
- We evaluated older forest amount and distribution corresponding to three points along a continuum of older forest definitions defined by average tree size, canopy layering, species composition, and potential natural vegetation.
- Older forest defined by average tree size ≥20 inches in diameter occupied 34 percent or 7.9 (±1.9) million acres of federal forested land at the start of the Plan. 12% (2.7±0.3 million acres) of federal forested land contained trees averaging ≥30 inches and having multi-layered canopies.
- Gains well outpaced losses from all causes between 1994 and 2003. We projected an increase of over 1 mllion acres of older forest in the first decade after the Plan, using remeasured plot data. This was a net increase after taking into account losses from stand-replacing harvest and wildfire. Two-tenths of a percent (about 16,900 acres) of older forest was removed by clearcutting harvests. Another 1.3 percent (about 102,500 acres) was burned by stand-replacing wildfires. Three-quarters of the total was burned in the Oregon and California Klamath physiographic provinces during the 2002 Biscuit Fire.
- At least 1.7 million acres of existing older forest acres were in fire-adapted vegetation types characterized by high fire frequency and low severity in the Eastern Cascades and Klamath provinces. Up to 1 million additional older forest acres occurred in dry mixed-conifer types in the Western Cascades. Twentieth-century fire-suppression policies and resulting accumulation of fuel has increased the susceptibility of these older forests to catastrophic wildfire. Therefore it will be very important to consider wildfire when evaluating management policies aimed at perpetuating a healthy, functioning older forest ecosystem in the Northwest Forest Plan area.

Looking Ahead

2005 will mark the publication of the 10-year status and trend report. Monitoring will collaborate closely with partners at the Pacific Northwest Research Station and Oregon Department of Forestry on developing approaches to landscape-level simulations for evaluating policy alternatives. The focus will be on using models that are sensitive to ecological setting and that can realistically represent forest succession, historical and current disturbance regimes, and management. The results are designed to be useful for forest plan revisions as well as for regional monitoring needs.

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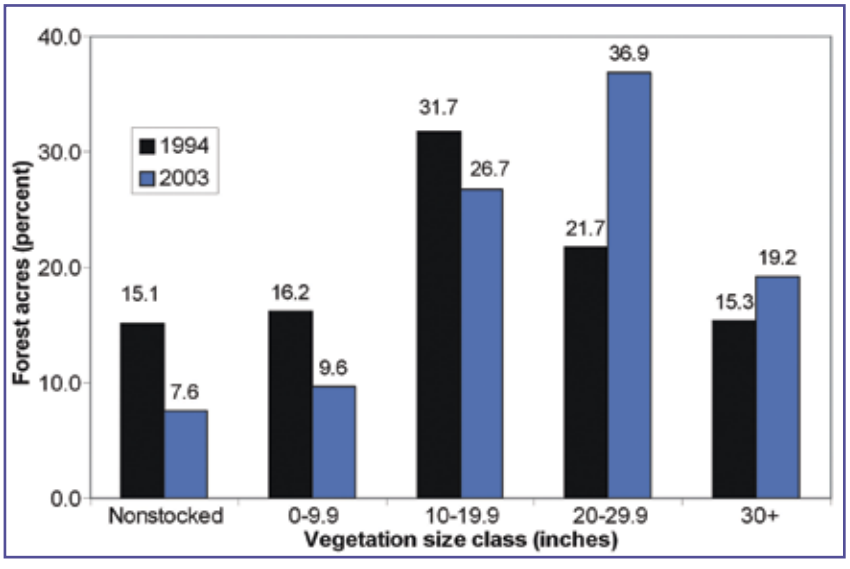
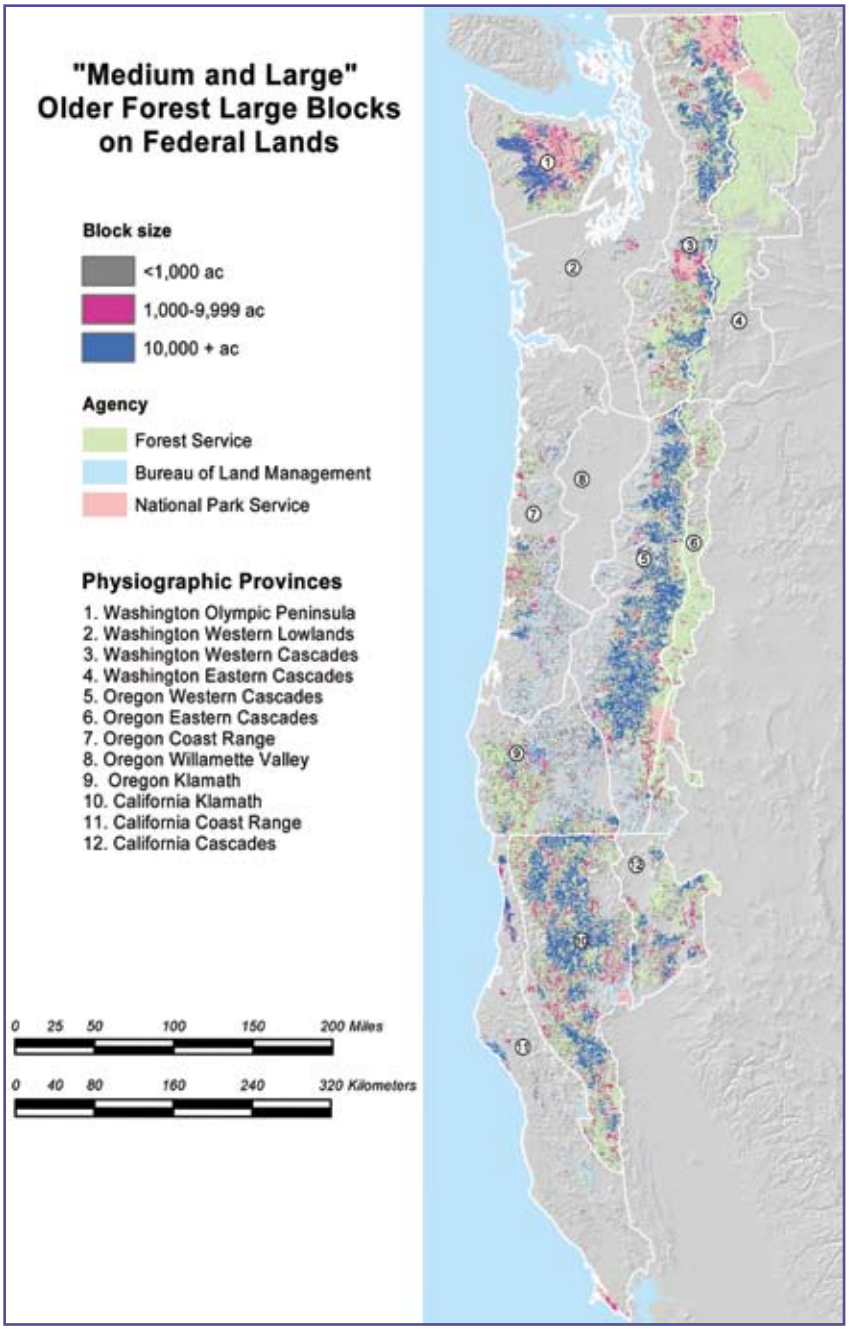
Percentage of forest by diameter clases in 1994 and 2003 from remeasured plot data.





Percentage of federal forest occupied by older forest at the start of the Northwest Forest Plan.

Province	M&L	Zone	L-MS
CA Cascades	36	37	2
CA Coast Range	47	41	21
CA Klamath	43	43	9
OR Coast Range	37	25	21
OR Eastern Cascades	15	19	2
OR Klamath	34	26	18
OR Western Cascades	44	35	17
OR Willamette Valley	25	15	0
WA Eastern Cascades	5	12	0
WA Olympic Peninsula	43	33	20
WA Western Cascades	38	32	15
WA Western Lowlands	5	1	0
Northwest Forest Plan	**34**	**30**	**12**

M&L="medium and large older forest"--minimum 10 percent canopy cover, minimum average tree size 20 in (quadratic mean diameter), single- or multistoried canopies. Total area = 7.87±1.96 million acres.

Zone="older forest with size indexed to vegetation zone"--minimum 10 percent canopy cover, minimum average tree size varies by vegetation zone. Total area = 7.04±1.93 million acres.

L-MS="large, multistoried older forest"--minimum 10 percent canopy cover, minimum average tree size 30 in, multistoried canopy. Total area = 2.72±0.35 million acres.

Percentage of older forest area falling in fire-regime condition classes.

	Condition Class		
Province	**1**	**2**	**3**
CA Cascades	7	33	58
CA Coast Range	2	77	3
CA Klamath	0	41	58
OR Coast Range	86	12	1
OR Eastern Cascades	27	33	38
OR Klamath	11	22	66
OR Western Cascades	10	84	6
OR Willamette Valley	13	54	27
WA Eastern Cascades	40	36	21
WA Olympic Peninsula	87	7	5
WA Western Cascades	38	59	2
WA Western Lowlands	1	99	0

Condition class 1=within historical range; 2=moderately departed, often having missed at least one fire-return interval; 3=greatly departed from historical conditions, often having missed two or more fire-return intervals.

Moss-covered logs and complex canopy layering in an old-growth western hemlock and Douglas-fir stand.

Northern Spotted Owl . . . . . .

Although 2004 marked the eleventh consecutive year of monitoring northern spotted owl (*Strix occidentalis caurina*) populations under the Northwest Forest Plan, there was an added focus on completing the ten-year report on status and trend of the owl's population and their habitat.

The analyses of data from the demographic study areas, and the development and analysis of habitat suitability maps were key tasks completed in 2004 to support the 10-year report.

10-Year Report Highlights

Population status and trend

- The status and trend of northern spotted owl populations in the demographic study areas were analyzed during an 8-day workshop in January, 2004.
- Eleven of the 14 study areas analyzed contained federal lands managed under the Northwest Forest Plan (Anthony et al. 2004).
- On these 11 areas, survival for adults was > 0.85 for all areas except two. Declines in survival, over time, were detected in 5 out of the 11 areas. These declines are important because annual rates of population change have been found most sensitive to changes in adult survival. One of the keys to stable populations is having high (>0.85), non-declining, adult survival.
- The fecundity (number of female young produced per territorial female) trend for the 11 Plan-related study areas was stable for 6 study areas, decreasing for 4 areas, and increasing on one of the areas.
- The rate of population change was calculated for 10 of the 11 areas. Populations in 3 of the study areas, all located in the southern half of the owl's range, were stationary during the monitoring period. The other 7 study areas had declining populations. Six of these areas were in the northern half of the range.
- The average annual rate of population decline for all 10 areas was 3.4 percent. Anthony et al.(2004) pointed out that the rate of decline in some of the study areas was noteworthy, particularly the precipitous declines for the 4 study areas in Washington. The average annual rate of population decline for the 4 study areas in Washington was 7.1 percent.
- Anthony et al. (2004) suggested possible causes for declines in owl survival and populations may include high density of barred owls in study areas in Washington and parts of Oregon, loss of habitat from past and present wildfire and timber harvest, poor weather conditions, and forest defoliation from insect outbreaks.

Habitat status and trend

- About 74 percent of 24,444,000 acres of federal land has the capability to develop habitat for territorial spotted owls. Habitat-capable federal acres (habitat-capable acres) include those below the elevation limits of occupancy by territorial owls and not on serpentine soil areas.
- A computer model was used to create habitat suitability maps for the habitat-capable area. Habitat suitability ranges, on a continuous scale, from 0-100. Generally, areas with habitat suitability in the 41 to 100 range have characteristics similar to areas where territorial owls have been found.
- Across the range, about 57 percent of the habitat-capable acres had a habitat suitability of ≥41. About 35 percent had a score in the range of 0 to 40, and the remaining 7 percent was in the unknown class.
- Range-wide, 1.5 percent of the habitat-capable area was affected by stand replacing timber harvest and wildfire. Timber harvest

Recording data for fledgling spotted owl.

Spotted owl with prey item taken from owl biologist during survey.

affected about 0.25 percent and wildfire 1.3 percent of the habitat-capable acres. The area affected by wildfire was greatest in the East Cascades provinces of Washington and Oregon, the West Cascades Province in Oregon, and the Klamath Provinces in California and Oregon.

- The Plan has shown its strength in the short term for maintaining habitat and is expected to do equally well in restoring habitat over time. At the end of the first 10 years, habitat conditions are no worse, and perhaps better than expected.

Monitoring Results for 2004

Just over 1200 sites were surveyed in the eight demographic study areas during the 2004 field season to gather data on occupancy, survival, and reproductive success of territorial spotted owls. Occupancy of the sites by pairs of owls was 47.5% which follows the levels noted in previous survey years. The number of young fledged jumped from 166 in 2003 to 550 in 2004. The 2004 number also exceeded counts of 492 fledglings in 2001 and 445 in 2002.

Looking Ahead

In the fall of 2005, the Forest Service's Pacific Northwest Research Station will publish the results of the ten-year spotted owl monitoring effort in a general technical report. In the coming year, the future direction for the spotted owl program will be deliberated by the federal monitoring program partners. Among the topics for discussion will be opportunities to learn more about the cause and effect relations between spotted owls and barred owls and the possible effects of new stressors like West Nile virus.

References

Anthony, R.G., E.D. Forsman, A.B. Franklin, D.R. Anderson, K.P. Burnham, G.C. White and others. 2004. Status and trends in demography of northern spotted owls, 1985-2003. Final report to the Regional Interagency Executive Committee. Portland, Oregon.

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Spotted owl habitat suitability map for the Coast Range province in Oregon created by using the Bio Mapper software program. (Map produced by Ray Davis)

Marbled Murrelet . . . . . .

The purpose of the effectiveness monitoring program for the marbled murrelet is to assess population trends and to determine characteristics and trends of suitable habitat in the area of the Northwest Forest Plan.

Information gathered for this assessment is used to help managers maintain and restore marbled murrelet habitat and populations on Federal lands. Effectiveness monitoring for the marbled murrelet has two facets: (1) assess population trends at sea using a unified sampling design and standardized survey methods and (2) establish a credible estimate of baseline nesting-habitat data by modeling habitat relations, and use the baseline to track habitat changes over time.


Photo © John Deal

The primary activity during the past year was to prepare a 10-year report on effectiveness monitoring of marbled murrelet (Huff, in press). The report will be published by the U.S. Forest Service Pacific Northwest Research Station as a General Technical Report (No. 650). Citations related to this report are shown in the Publications and Reports section.

Summary of marbled murrelet populations estimates for the 2004 breeding season across all five conservation zones in the Northwest Forest Plan area. Results of the 2004 breeding season were not available in time to include in the 10-year report.

Variable	Estimate
Area sampled (km^2)	8,886
Population estimate	20,600
95% confidence interval for population	+/- 4,600
Density (birds/km^2)	2.3
Coefficient of variation of density (%)	11.5

Below is a summary of the information presented in the 10-year report and the new 2004 population estimates.

Background

To estimate population size, we sampled from boats using line transects within 8 km of the Washington, Oregon, and northern California coastline, covering about 8,800 km^2. To model the baseline amount and distribution of nesting habitat, we used three approaches: expert judgment, ecological niche factor analysis, and logistic regression. Examples of suitable habitat maps produced from the modeling are shown on page 11.

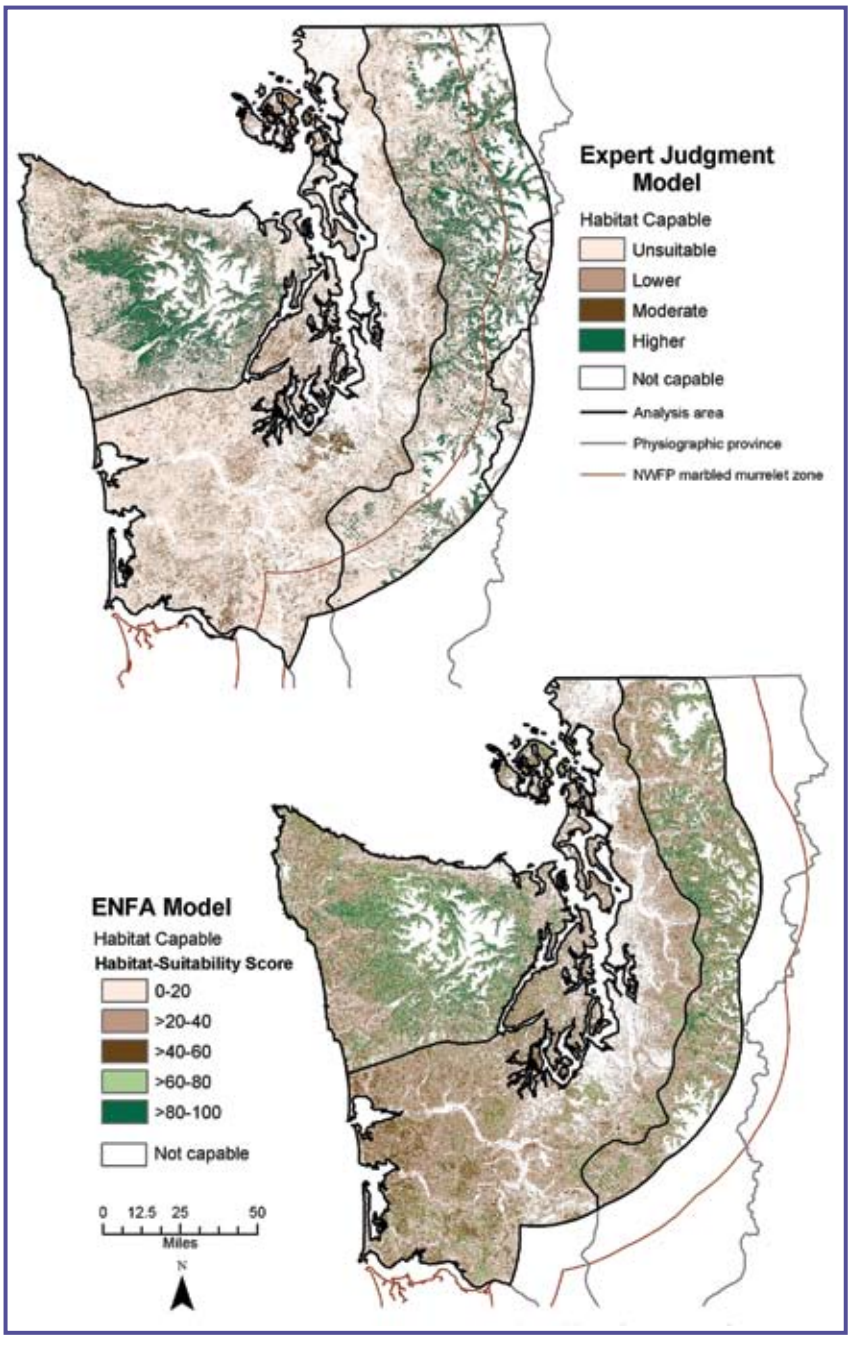
10-Year Report Highlights

- We estimated that the population size of marbled murrelets at sea is about 22,000 birds (on any single day) for the coastal waters adjacent to the Plan.
- The 95% confidence interval for the population size ranges from about 18,500 to 29,000 birds.
- From 2000-2003, the largest population was in the Puget Sound and Strait of Juan de Fuca of Washington; the highest densities were along the coast of Oregon and California, north of the Humboldt-Mendocino County line, and the smallest population and lowest density were from the Humboldt-Mendocino County line south about 200 miles to San Francisco Bay, California.
- Marbled murrelet population estimates did not change significantly over 4 years.
- We estimated that 15 total years of surveys will be needed to detect a 2 percent annual decrease, or 9 total years to detect a 5 percent decrease with high certainty.
- Our habitat model predicted that murrelet nesting habitat is more likely at sites that are closer to the sea, are on relatively flat terrain, are topographically cooler, have relatively fewer conifers above pole size (>10 inch diameter at breast height or dbh), have greater basal area of trees above pole size, and have greater basal area of larger-diameter trees (>30 inch dbh).
- Estimates of amounts of baseline nesting habitat varied with modeling approaches, but all models showed that over 88 percent of baseline habitat on federally-administered lands occurred in reserved lands.
- Across all lands in the Plan area, we estimated that about 52 percent of higher-quality potential nesting habitat occurred on non-federal lands.
- In reserved lands including National Parks, Washington had

the highest amount of high-quality habitat, 55 percent of the total; Oregon and California had 36 and 9 percent, respectively. On Federal lands outside National Parks, Oregon had the most high-quality nesting habitat.

- The Olympic Peninsula province accounted for over 35 percent of the high-quality habitat on federally-administered lands; this habitat was primarily in the Olympic National Park.

Example of habitat suitability clsses mapped from the Expert Judgement model (upper left) and habitat suitability scores mapped frm the Ecological Niche Factor model (lower right) in Washington, from Chapter 5 by Raphael at al. in the 10-year report.



- Logistic models predicted that only 13 percent of US Forest Service and Bureau of Land Management land are above moderate-quality habitat for nesting.

- Fire and harvest have led to losses of nesting habitat since the Plan was implemented, with higher rates of loss on nonfederal lands.

- Of the two marbled murrelet inland management zones in the Plan, the zone furthest from the coast, zone 2, accounted for <2 percent of the estimated high-quality habitat on federally-administered lands.

2004 Population Estimates

The marbled murrelet Northwest Forest Plan at-sea population estimate (on a single day surveys) was about 20,600 birds (table 1). The 2004 estimate was about 7 percent and about 13 percent lower than 2003 and 2002 population estimates, respectively.

The 95 percent confidence interval of the 2004 population estimate overlapped all other survey years from 2000 to 2003. Additional annual at-sea monitoring will be needed to detect a statistically significant change in murrelet population estimates.


Photo by Rich MacIntosh

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Watershed Condition . . . . . .

The watershed monitoring module (also known as the Aquatic and Riparian Effectiveness Monitoring Program or AREMP) was developed to determine whether the Plan's aquatic conservation strategy is achieving its goals of maintaining and restoring the condition of watersheds. The monitoring program spent 2004 conducting the first quantitative evaluation of the effectiveness of the Plan.

The 10-year Plan assessment determined the current condition of 250 randomly selected watersheds and tracked changes in condition of these watersheds through time. Watershed condition assessments were based on a combination of upslope, riparian, and stream channel information.

A decision-support model was used to aggregate the road, vegetation, and in-channel data and calculate an index of watershed condition. This model was developed by using data and local expert judgment.

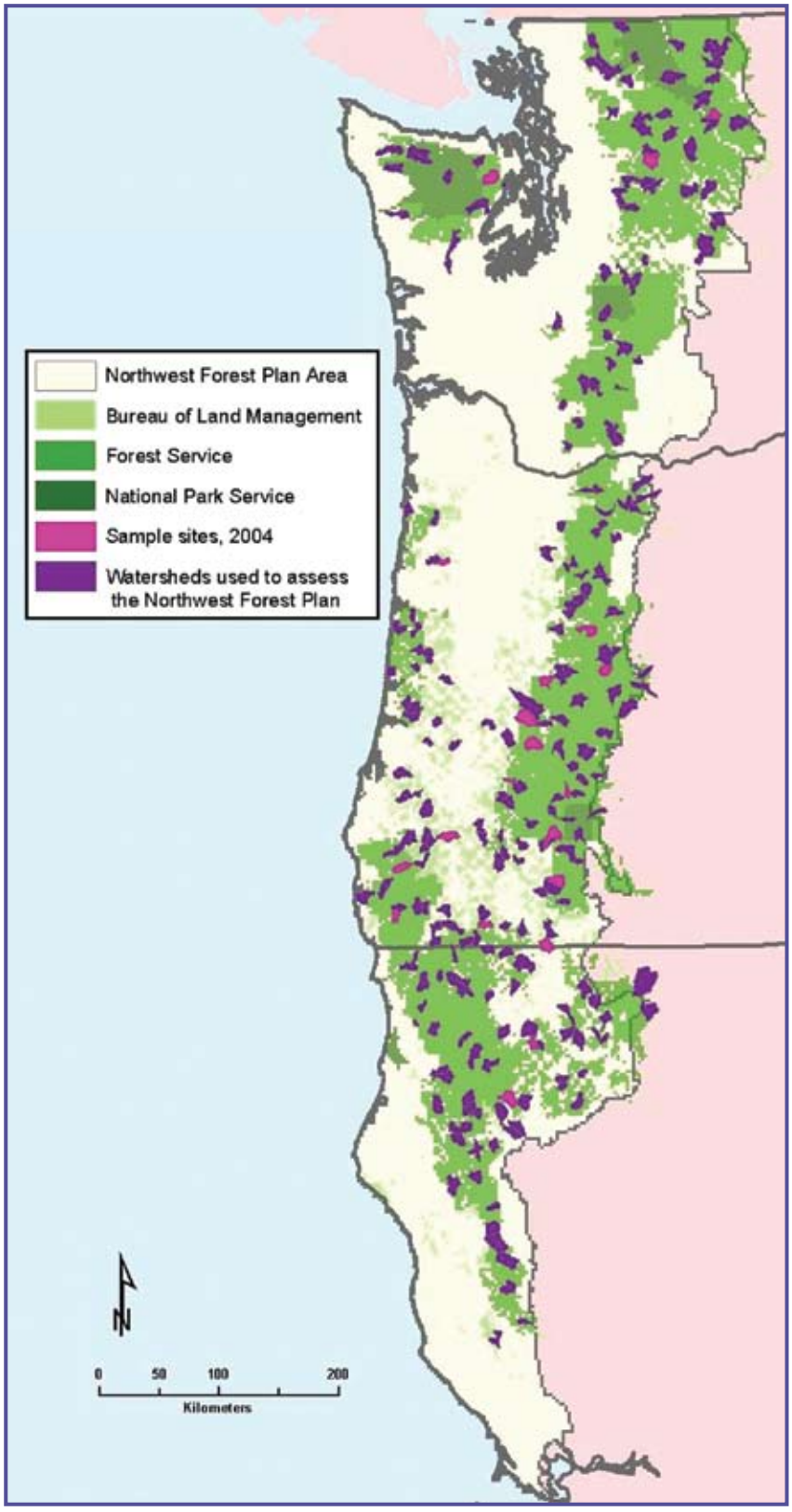
The watershed monitoring program was implemented in 2002; consequently, in-channel data were available for only 55 of the 250 randomly selected watersheds. Road and vegetation data, which were available for 1994 and 2003 in all watersheds, were used to examine trends.

Local aquatic experts examined the results of the decision support models and suggested changes to the evaluation criteria and the weights of individual attributes.

10-Year Report Highlights

Since watershed processes occur on the scale of decades or even centuries, it was not surprising that nearly all of the changes in watershed condition scores were very small.

250 watersheds were used to assess how watershed condition changed from 1994-2003. The 20 watersheds where stream reaches were sampled in 2004 are also shown.



Nevertheless, it appears that the Aquatic Conservation Strategy has had overall positive effects on watershed condition, based on the following evidence:

- Fifty-seven percent of the watersheds had higher condition scores in time 2 (about 2003) than in time 1 (about 1994) across the Plan area. Only 3 percent of the watersheds decreased in condition, and condition did not change in the remainder of the watersheds.
- Seven watersheds had strong positive or negative changes: those that increased in condition were targets of road decommissioning, those that decreased in condition experienced wildfire (and not management activity).
- The increase of large conifers across the landscape (8 percent) exceeded losses (1.6 percent due to stand replacing fire and harvest). Also, nine times more roads were decommissioned than were constructed.

2004 Watershed Sampling Summary

Twenty watersheds spread throughout the Plan area were sampled during 2004 (see map on page 12). These watersheds are a subset of the 250 watersheds selected for monitoring. Data on the physical, biological, and chemical attributes were collected at 4-8 randomly selected sites in each watershed.

Twenty trend sites were also surveyed to increase our ability to detect change. An additional 20 sites were sampled by independent crews for quality control. Data and reports are available at the following webite: http://www.reo.gov/monitoring.

Other program accomplishments include:

- Refinement of the decision-support models was completed this year. Changes were made to ensure that the model results were consistent with the conditions on the ground.
- AREMP and PacFish/InFish (a similar large-scale watershed condition monitoring effort occurring on the east side of the Cascades) staff agreed upon common field protocols for a core set of physical, biological, and chemical attributes that are used by both programs to conduct watershed monitoring.
- The Field Data Quality Assessment Program began exploring how to compare distributions of initial surveys and resurveys in order to establish differences between measurements. This information will be used to determine the program's ability to detect change.
- A landslide model is being developed to determine which topographic features are associated with landslides. We are attempting to extend the landslide models used by the Coastal Landscape Analysis and Modeling Study (CLAMS) to the extent of the Plan (Miller and Burnett, In press).

References

Miller, D. and K. Burnett. In press. An empirical model to characterize debris flow delivery to stream channels. Geomorphology.

A protocol to prevent the spread of invasive aquatic species and disease included boiling wading shoes after sampling a watershed.

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Social & Economic

The purpose of the socioeconomic monitoring module is to evaluate progress in meeting the Plan's socioeconomic goals, and to address two socioeconomic monitoring questions contained in the Record of Decision (ROD): 1) "Are predictable levels of timber and nontimber resources available and being produced?" and 2) "Are local communities and economies experiencing positive or negative changes that may be associated with federal forest management?"

In 2004, the monitoring team finished gathering data for the 10-year interpretive report. Local-scale monitoring was completed on four federal forests and in 12 case-study communities, and regional-scale data were compiled. The team focus was on data analysis, interpretation, and writing the 10-year report. The socioeconomic report is being published in six volumes by Pacific Northwest Research Station.

Happy Camp, part of the mid-Klamath case-study community.

Volume I of the report contains key findings. Volume II addresses the ROD question, "Are predictable levels of timber and nontimber resources available and being produced?" It also evaluates progress in meeting the Plan goal of producing a predictable level of timber sales, special forest products, livestock grazing, minerals, and recreation opportunities.

The focus of Volume III is the ROD evaluation question, "Are local communities and economies experiencing positive or negative changes that may be associated with federal forest management?" Two Plan goals are also assessed in Volume III: to maintain the stability of local and regional economies on a predictable, long-term basis; and, to assist with long-term economic development and diversification to minimize adverse impacts associated with the loss of timber jobs.

Case study community on the Olympic peninsula.

Progress in meeting another Plan goal – to promote agency-citizen collaboration in forest management – is evaluated in Volume IV. A fifth Plan goal was to protect forest values and environmental qualities associated with late-successional, old-growth, and aquatic ecosystems. In Volume V we address the topic of forest protection from the socioeconomic perspective.

Volume VI provides a history of the Northwest Forest Plan socioeconomic monitoring program (from 1999-2004), and a discussion of potential future directions for the program. To view the draft report on line (all six volumes), go to http://www.reo.gov/monitoring/10yr-report/social-economic/final-report.html.

Rafting on the Klamath River, a growing recreation activity.

10-Year Report Highlights

- The Northwest Forest Plan attempted to balance goals for protecting older forests with goals for producing forest products and sustaining local economies. Monitoring results show that progress in meeting Northwest Forest Plan socioeconomic goals has been mixed, and that the Plan fell short of providing many of the anticipated benefits to communities.
- Timber sales between 1995 and 2003 were estimated at 54 percent of the probable sale quantity established by the Plan. Primary

wood products employment in the Plan area decreased by 30,000 jobs between 1990 and 2000, partly because of cutbacks in federal timber harvest and partly because of industry restructuring.

- Grazing and mining activity declined during the decade. Trends in nontimber forest products harvesting and in recreation opportunities were mixed.

- Forest Service field units in the Plan area lost over one-third of their budgets and their workforce over the decade, and about one-quarter of the field offices closed or consolidated. In contrast, the BLM field units in the Plan area did not experience similar declines.

Transportation of wood products.

- Forest Service spending on contracts for ecosystem management work, which can create local jobs, dropped nearly 70 percent. BLM contract spending for ecosystem management work held steady.

- In the 72 counties within the Plan area, about one-fifth of the population (2 million people) lives within 5 miles of a federal forest. Based on a socioeconomic well-being score developed from US Census indicators, socioeconomic well-being between 1990 and 2000 dropped for about 40 percent of the communities within five miles of a forest, increased for 37 percent, and stayed about the same for the remaining 23 percent.

The extent to which the Northwest Forest Plan contributed to these changes is difficult to quantify, because other variables were also at play. Plan effects on communities varied, depending on the strength of the timber sector there in 1990, the extent to which timber from federal forest lands supported that sector, and the number of agency employees resident there.

- Economic ties between communities and forests changed during the decade as timber workers and agency employees moved out, and new residents attracted to the amenity values associated with federal forests moved in. Communities are adapting to change in many ways, including focusing on agriculture, investing in recreation and tourism, using nearby major transportation corridors to attract business and to commute where possible, expanding as regional centers, and depending on the growth of tribal business, administration, and services.

- The Northwest Economic Adjustment Initiative was largely unsuccessful in creating sustainable, forest-related local jobs comparable to the number and quality of those lost. Payments to counties legislation, adopted to mitigate the decline in timber receipts for county governments, was largely successful, but the law sunsets in 2006 and renewal is uncertain.

- Pacific Northwest residents' values about forest management changed little over the past decade. Clearcutting is unpopular, most people favor protecting old-growth forests, and most believe active forest management is needed to maintain forest health. There is broad support for multiple use management, but when asked to choose, the majority of people surveyed favored environmental over economic forest management objectives.

- Many community members interviewed for this study hope there will be future opportunities to link the biophysical and socioeconomic goals of the Plan by creating local jobs associated with maintaining and restoring forest ecosystems.

Looking Ahead

In 2005, monitoring will continue in five communities around the Okanogan-Wenatchee National Forest in Washington. This work will increase our sample of case-study communities and help us understand the effects of the Northwest Forest Plan on communities in the Yakima and Eastern Washington Cascades Provinces of the Plan area. The 10-year interpretive report containing the results of the socioeconomic monitoring work will be completed and published as a Pacific Northwest Research Station General Technical Report.

To view the draft report on line, go to http://www.reo.gov/monitoring/10yr-report/social-economic/final-report.html. The final report should be published by December 2005.

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Tribal

The tribal monitoring program is designed to evaluate the unique government-to-government relationship between federal land managers and tribal governments in the Plan area. A total of 76 federally recognized tribes consult with land managers in the Plan area about resources, places of interest, and the quality of the federal-tribal relationship. Key issues addressed by tribal monitoring are:

- Conditions and trends of resources protected by treaty or of interest to American Indian tribes, and access to those resources
- Condition of and access to sites of religious and cultural heritage
- Quality of the government-to-government relationship

Highlights

Tribal monitoring efforts in 2004 focused on continuing tribal monitoring interviews, planning a Tribal Forum, and compiling the results of tribal monitoring for the Northwest Forest Plan 10 Year Review. Interviews were conducted with two additional tribes, the Quileute Tribe and Makah Indian Tribe, both of Washington. This brought the total number of interviewed tribes to 15. To supplement information gathered through interviews, plans were made to hold a Tribal Forum in 2005.

The purpose of the forum was to document additional tribal perspectives of Plan area tribes regarding federal land management and government-to-government consultation under the Plan. The main purpose of monitoring work in 2004 was presenting the results of tribal monitoring in an interpretive report.

American Indian Tribe	Year Interviewed
Quinault Tribe (WA)	2002
Lower Elwha Tribal Community (WA)	2002
Confederated Tribes of the Grand Ronde Community (OR)	2002
Coquille Indian Tribes (OR)	2002
Bear River Band of the Rohnerville Rancheria (CA)	2003
Blue Lake Rancheria (CA)	2003
Karuk Tribe of California (CA)	2003
Round Valley Indian Tribes (CA)	2003
Lummi Tribe (WA)	2003
Table Bluff Reservation – Wiyot Tribe (CA)	2003
Upper Lake Band of Pomo Indians (CA)	2003
Yurok Tribe (CA)	2003
Hoopa Valley Tribe (CA)	2003
Quileute Tribe (WA)	2004
Makah Tribe (WA)	2004

Above: Helen Suri
Photos by Ken Wilson

Lessons Learned

- The condition of aquatic and riparian habitats, fisheries, and forest health has improved under the Plan.
- Cooperative relationships between federal and tribal leaders are more productive under the Plan, partnerships have been formed to implement projects on the ground, and some tribal resource needs have been accommodated.
- Tribes prefer "layered" consultations that combine informal staff contact with formal government-to-government consultation.
- The planning process sometimes slows management of trust resources and resources of interest on the ground.

Looking Ahead

The tribal monitoring program will be reviewed in 2006. Results of this review will determine what changes need to be made.

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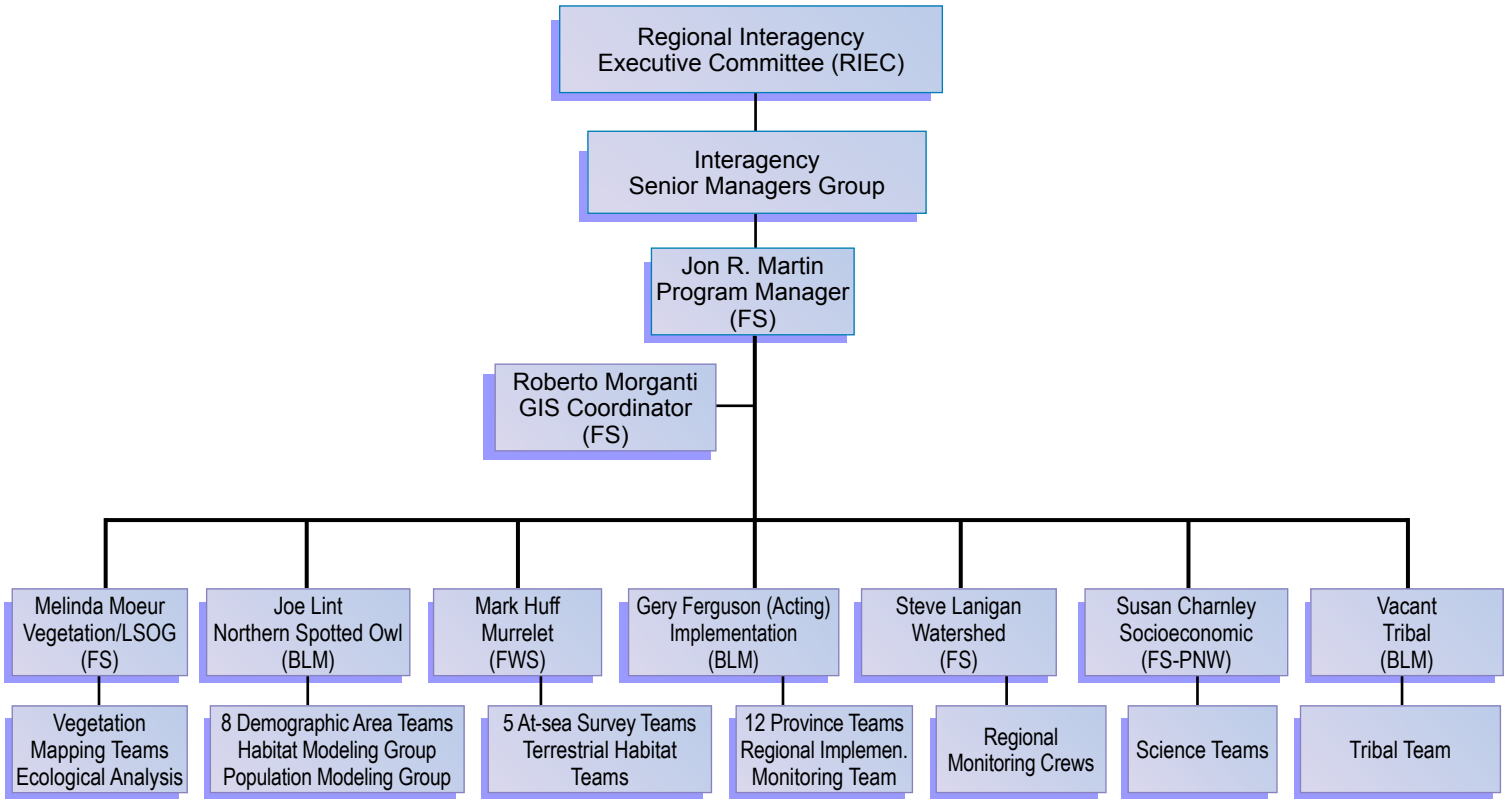
Budget

NWFP Monitoring - Priorities		Needs	FY 2004 Contributions ($ 1000) BLM	R-5	R-6	NPS	FWS	PNW	PSW	USGS	EPA	NOAA-Fish	Total
Program	Manager	110		55	55								110
	Asst. Mgr & GIS	255		60	95								155
	Contracts, 04 Rpt	322			50			50	50				150
	TOTAL	687	0	115	200	0	0	50	50	0	0	0	415
Implementation	Lead	110	110										110
	Regional IMT	140	35	20	30		30						115
	04 Report	35	35										35
	Field Costs (24x5)	120											0
	MODULE TOTAL	405	180	20	30	0	30	0	0	0	0	0	260
NSO	Lead	80	80										80
	Demography	2100	714	306	900	140							2060
	Models/Maps	345			55			160		143			358
	04 Rept/Meta-analysis	75	50										50
	RFP-Random Grid	250	50	50	50								150
	MODULE TOTAL	2850	894	356	1005	140	0	160	0	143	0	0	2698
LSOG-VEG	Lead	114			117								117
	RSL	135		135									135
	Veg. Change PNW	133		30	103								133
	LSOG model	91			91								91
	PNW modeling	125		25	50								75
	MODULE TOTAL	598	0	190	361	0	0	0	0	0	0	0	551
MaMu	Lead	110					110						110
	Population	654					245	216	97				558
	Habitat modeling	146					50	58	38				146
	04 Report	85											0
	MODULE TOTAL	995	0	0	0	0	405	274	135	0	0	0	814
Watershed	Lead	102			102								102
	Ops & GIS Staff	353	145	49	66								260
	DSM Development	291		8	69								77
	Wtrshed Sampling	1006	75	147	220						120	170	732
	04 Report	81						66		15			81
	MODULE TOTAL	1833	220	204	457	0	0	66	0	15	120	170	1252
Socio-econ	Lead	115			115								115
	Asst. GIS Tech	84		60	20								80
	Community Pilot	161		60	120								180
	Lab, Admin, Other	74		25									25
	MODULE TOTAL	434	0	145	255	0	0	0	0	0	0	0	400
Biodiversity	Plan	158						20		27			47
	MODULE TOTAL	158	0	0	0	0	0	20	0	27	0	0	47
Tribal	Lead	75	75										75
	Tribal Advisory Group												
	Tribal Liaisons	30		10	5								15
	Travel	30	10	5									15
	MODULE TOTAL	135	85	15	5	0	0	0	0	0	0	0	105
Totals		**8095**	**1379**	**1045**	**2313**	**140**	**435**	**570**	**185**	**185**	**120**	**170**	**6542**
	% contributed fy04		**21.1**	**16.0**	**35.4**	**2.1**	**6.6**	**8.7**	**2.8**	**2.8**	**1.8**	**2.6**	**100.0**

Interagency Monitoring Program Team . . .



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Reports

Implementation Monitoring Module

Baker, D. and others. Implementation Monitoring: 2003 Annual Summary Report. 91 pages. August, 2004.

Hoffman, W. and others. 2004. Provincial Implementation Project and Watershed Assessment Monitoring Reports. 42 reports of various lengths. October, 2004. On file at Forest Service regional office in Portland, Oregon.

Northern Spotted Owl Effectiveness Monitoring Module

Anthony, R.G., E.D. Forsman, A.B. Franklin, D.R. Anderson, K.P. Burnham, G.C. White and others. 2004. Status and trends in demography of northern spotted owls, 1985-2003. Final report to the Regional Interagency Executive Committee. Portland, Oregon.

Anthony, R., S. Ackers, R. Claremont, D. Hausleitnerr, E. Raymond, J. Schilling, Alexis Smoluk, and S. Turner-Hane. 2004. The ecology of northern spotted owls (*Strix occidentalis caurina*) on the Willamette National Forest, Oregon†: Habitat use and demography. Annual Research Report. Oregon Cooperative Fish and Wildlife Research Unit, Oregon State University, Corvallis, OR 40p.

Anthony, R., S. Andrews, F. Wagner, W. King, T. O'Brien, T. Phillips, and G. Rible. 2004. Demographic characteristics of spotted owls (*Strix occidentalis caurina*) in the southern Oregon Cascades. Annual Research Report. Oregon Cooperative Fish and Wildlife Research Unit, Oregon State University, Corvallis, OR 31p.

Anthony, R.G., E.D. Forsman, A.B. Franklin, D.R. Anderson, K.P. Burnham, G.C. White and others. 2004. Status and trends in demography of northern spotted owls, 1985-2003. Final report to the Regional Interagency Executive Committee. Portland, Oregon.

Forsman, E., J. Reid, S. Graham, J. Mowdy, and A. Price. 2004. Demographic characteristics of northern spotted owls (*Strix occidentalis*) on the Tyee study area, Roseburg, Oregon†: 1985-2004. Annual Report. USDA Pacific Northwest Research Station, Corvallis, OR 12p.

Forsman, E., P. Loschl, T. Snetsinger, C. McCafferty, B. Meiering, D. Lindley, T.Grubert, and K. Skybak. 2004. Demographic characteristics of spotted owls in the Oregon Coast Ranges, 1990-2004. Annual Report. USDA Pacific Northwest Research Station, Corvallis, OR 17p.

Forsman, E., S. Sovern, and M. Taylor. 2004. Demography of spotted owls on the east slope of the Cascade Range, Washington, 1989-2004. Annual Progress Report. USDA Pacific Northwest Research Station, Corvallis, OR. 12p.

Forsman, E., B. Biswell, M. Amos, W. King, D. Kelso, M. Koranda, K. Laubenheimer, L. Page, and A. Rex. 2004. Demographic characteristics of northern spotted owls (*Strix occidentalis*) on the Olympic Peninsula study area, Washington, 1985-2004. Annual Report. USDA Pacific Northwest Research Station, Corvallis, OR 21p.

Gremel, S. 2004. Spotted owl monitoring in Olympic National Park: 2004 Annual Report. Olympic National Park. Port Angeles, WA 14p.

Horn, R. F. Oliver, C. Larson, M. Koranda, M. O'Hara, M. Oleri, H. Wise, M. Irwin, K. Fukuda, and P. Colvard. 2004. Demographic characteristics of northern spotted owls (*Strix occidentalis caurina*) in the Klamath Mountains Province of Oregon, 1983-2004. Annual Report, FY2004. Roseburg District, Bureau of Land Management, Roseburg, OR 11p.

Franklin, A., R. Gutierrez, P. Carlson, T. Hamer, J. Rockweit, L. Quattrini, R. Reidner, and A. McLain. 2004. Monitoring the population ecology of spotted owl (*Strix occidentalis caurina*) in northwestern California: Annual results, 2004. Annual Progress Report. Contract FS/53-91S8-00-ec14. Univ. of Minnesota, St. Paul, MN. 22p.

Late-Successional and Old-Growth Effectiveness Monitoring Module

Browning, J.; Kroll, KC; Grob, C.; Ducey, C.; Fassnacht, K.; Alegria, J.; Nighbert, J; Moeur, M.; Fetterman, J.; Weyermann, D. 2003. Interagency Vegetation Mapping Project (IVMP). Eastern Cascades Oregon Province Version 1.1. June 2003. 46p. http://www.or.blm.gov/gis/projects/ivmp_data.asp.

Browning, J.; and others. 2003. Interagency Vegetation Mapping Project (IVMP). Eastern Cascades Washington Province Version 1.0. May 2003. 41p.

Browning, J.; and others. 2003. Interagency Vegetation Mapping Project (IVMP). Klamath Oregon Province Version 1.0. September 2003. 44p.

Browning, J.; and others. 2003. Interagency Vegetation Mapping Project (IVMP). Oregon Coast Province Version 3.0. September 2003. 37p.

Browning, J.; and others. 2004. Interagency Vegetation Mapping Project (IVMP). Willamette Valley, Oregon Province Version 1.0. January 2004. 43p.

Fassnacht, K.S.; Weyermann, D.; Browning, J.; Alegria, J.; Moeur, M.; Kroll, KC. [In prep.]. Interagency Vegetation Mapping Project (IVMP): I. Methods. On file with: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, 333 SW 1st Ave, Portland, OR, 97208.

Healey, S.P.; Cohen, W.B.; Krankina, O.N. 2005. Comparison of tasseled cap-based Landsat data structures for use in forest disturbance detection. Remote Sensing of Environment 97: 301-310.

Healey, S.; Cohen, W.B.; Moeur, M. [In prep.]. Mapping stand-replacing disturbances in the Northwest Forest Plan area between 1972 and 2002. On file with: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station, 3200 SW Jefferson Way, Corvallis, OR 97331.

Moeur, M. 2004. Late-successional and old-growth vegetation effectiveness monitoring, Northwest Forest Plan: 2003 annual summary report.

Moeur, M.; Spies, T. A.; Hemstrom, M.; Martin, J. R.; Alegria, J.; Browning, J.; Cissel, J.; Cohen, W. B.; Demeo, T. E.; Healey, S.; Warbington, R. In press. Northwest Forest Plan–the first 10 years [1994-2003]: status and trend of late-successional and old-growth forests. Gen. Tech. Rep. PNW-GTR-646. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station.

Marbled Murrelet Effectiveness Monitoring Module

Bloxton, TD, and MG Raphael. In Press. Breeding season movements of radio-tagged marbled murrelets in the Strait of Juan de Fuca, Washington. Pacific Seabirds (abstract).

Huff, Mark. H. [in press] Introduction to effectiveness monitoring of the Northwest Forest Plan for Marbled Murrelets. In: Huff, Mark H.; Raphael, Martin G.; Miller, Sherri L.; Nelson, S. Kim; Baldwin, Jim, Tech. Coords. Northwest Forest Plan--The First 10 Years: Status and Trends of Populations and Nesting Habitat for the Marbled Murrelet. Gen. Tech. Rep. PNW-GTR-650. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. Chapter 1.

Huff, Mark H.; Raphael, Martin G.; Miller, Sherri L.; Nelson, S. Kim; Baldwin, Jim; Young, Richard; Brown, Martin; and Evans Mack, Diane. [in press] Estimating the amount of Marbled Murrelet nesting habitat on federal lands using a systematic grid sampling strategy. In: Huff, Mark H.; Raphael, Martin G.; Miller, Sherri L.; Nelson, S. Kim; Baldwin, Jim, Tech. Coords. Northwest Forest Plan--The First 10 Years: Status and Trends of Populations and Nesting Habitat for the Marbled Murrelet. Gen. Tech. Rep. PNW-GTR-650. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. Chapter 4.

Miller, Sherri L.; Ralph, C. John; Raphael, Martin G.; Strong, Craig; Thompson, Christopher W.; Baldwin, Jim; Huff, Mark H.; Falxa, Gary A. [in press] At-sea monitoring of Marbled Murrelet population status and trend in the Northwest Forest Plan area. In: Huff, Mark H.; Raphael, Martin G.; Miller, Sherri L.; Nelson, S. Kim; Baldwin, Jim, Tech. Coords. Northwest Forest Plan—The First 10 Years: Status and Trends of Populations and Nesting Habitat for the Marbled Murrelet. Gen. Tech. Rep. PNW-GTR-650. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. Chapter 3.

Nelson, S. Kim; Huff, Mark H.; Miller, Sherri L.; Raphael, Martin G. [in press] Marbled Murrelet biology: Habitat relations and populations. In: Huff, Mark H.; Raphael, Martin G.; Miller, Sherri L.; Nelson, S. Kim; Baldwin, Jim, Tech. Coords. Northwest Forest Plan - The First 10 Years: Status and Trends of Populations and Nesting Habitat for the Marbled Murrelet. Gen. Tech. Rep. PNW-GTR-650. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. Chapter 2.

Raphael, M.G. [In press]. Conservation of listed species: the northern spotted owl and marbled murrelet. In: Haynes, R.W.; Bormann, B.T.; Lee, D.C.; Martin, J.R. The first ten years (1994-2003) of the Northwest Forest Plan: a synthesis of monitoring and research results. Gen. Tech. Rep. PNW-GTR-651. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. Chap. 7.

Raphael, M.G. 2004. Predicting abundance of Marbled Murrelet nesting platforms from tree diameter. Northwestern Naturalist 85:87 (abstract).

Raphael, Martin G.; Galleher, Beth M.; Huff, Mark H.; Miller, Sherri L.; Nelson, S. Kim; and Young, Richard. [in press] Spatially-Explicit Estimates of Potential Nesting Habitat for the Marbled Murrelet. In: Huff, Mark H.; Raphael, Martin G.; Miller, Sherri L.; Nelson, S. Kim; Baldwin, Jim, Tech. Coords. Northwest Forest Plan - The First 10 Years: Status and Trends of Populations and Nesting Habitat for the Marbled Murrelet. Gen. Tech. Rep. PNW-GTR-650. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. Chapter 5.

Strong, C.S. 2005. Marbled Murreled abundance and distribution at sea in Oregon during 2004. Annual report to the U.S. Fish & Wildlife Service. Crescent Coastal Research. P.O. Box 2108, Crescent City, CA. 17p.

Strong, C.S. 2005. Abundance and distribution of Marbled Murrelets in Mendocino, Sonoma, and Marin counties. 2004 Final Report to CA Dept. of Fish & Game, U.S. Fish & Wildlife Service, and NOAA Cordell Bank Nat. Mar. Sanctuary. Crescent Coastal Research. P.O. Box 2108, Crescent City, CA. 12 p.

Reports (cont.)

Watershed Condition Monitoring Module

Fausti, K; D. Dugaw, tech. coord. 2004. Effectiveness monitoring for streams and riparian areas within the Pacific Northwest. Stream channel methods for core attributes. Aquatic and Riparian Effectiveness Monitoring Program Staff

Multi-federal Agency Monitoring Program; Corvallis, OR & PACFISH/INFISH Effectiveness Monitoring Program Staff Multi-federal Agency Monitoring Program; Logan, UT. On file with http:// www.reo.gov/monitoring/watershed.

Gallo, K.; S.H. Lanigan; P. Eldred; S.N. Gordon; C. Moyer. [In press]. Northwest Forest Plan—the first 10 years (1994-2003): preliminary assessment of the condition of watersheds.Gen. Tech. Rep. PNW-GTR-647. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 133 p.

Larsen, D.P; A.R. Olsen; S.H. Lanigan; C. Moyer; K.K. Jones; T.M. Kincaid.[In press]. A design-based approach for integrating stream monitoring data across multiple programs. Journal of the American Water Resources Association.

Moyer, C.; S. Lanigan; K. Gallo; J. Chambers; K. Fausti. 2004. Aquatic and Riparian Effectiveness Monitoring Program. 2004 annual technical report. Corvallis, OR. On file with http://www.reo.gov/monitoring/watershed.

Social and Economic Effectiveness Monitoring Module

Jackson, J.E.; Lee, R.G.; Sommers, P. 2004. Monitoring the community impacts of the Northwest Forest Plan: an alternative to social indicators. Society and Natural Resources. 17: 223-233.

Charnley, S.; tech. coord. [In press]. Northwest Forest Plan - the first 10 years (1994-2003): socioeconomic monitoring results. Gen. Tech. Rep. PNW-GTR-649. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station. 6 vol.

Moseley, C.; [In Press]. Procurement contracting in the affected counties of the Northwest Forest Plan: twelve years of change. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station.

Synthesis Report

Haynes, R.W.; Bormann, B.T.; Lee, D.C.; Martin, J.R., Tech. Eds. 2005. Northwest Forest Plan – the first 10 years (1994-2003): synthesis of monitoring and research results. Gen. Tech. Rep. PNW-GTR-651. Portland, OR: U.S. Department of Agriculture, Forest Service, Pacific Northwest Research Station.

Chapter 1: Objectives of Northwest Forest Plan synthesis. R.J. Barbour, R.W. Haynes, R. White, and B.T. Bormann

Chapter 2: Context for the Northwest Forest Plan. R.J. Barbour, R.W. Haynes, J.R. Martin, D.C. Lee, R. White, and B.T. Bormann

Chapter 3: Synthesis: interpreting the Plan as more than the sum of its parts. B.T. Bormann, D.C. Lee, A.R. Kiester, T.A. Spies, R.W. Haynes, G.H. reeves, M.G. Raphael, D.E. Busch, J.R . Martin, N. Molina, R. Molina, and B.G. Marcot

Chapter 4: Summary. D. C. Lee

Chapter 5. The socioeconomic implications of the Northwest Forest Plan. R.W. Haynes, and E. Grinspoon

Chapter 6. Maintaining old-growth forests. T.A. Spies

Chapter 7. Conservation of listed species: the northern spotted owl and marbled murrelet. M.G. Raphael

Chapter 8. Conservation of other species associated with older forest conditions. B.G. Marcot, and R. Molina

Chapter 9. The aquatic conservation strategy of the Northwest Forest Plan: an assessment after ten year. G.H. Reeves

Chapter 10: Adaptive management and regional monitoring. B.T. Bormann, D.C. Lee, A.R. Kiester, D.E. Busch, J.R. Martin, and R.W. Haynes

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